B.SC.,
CHEMISTRY

SYLLABUS

FROM THE ACADEMIC YEAR
2023-2024

TAMILNADU STATE COUNCIL FOR HIGHER EDUCATION,
CHENNAI – 600 005

Title of the Course	CHEMISTRY FOR PHYSICAL SCIENCES II (FOR MATHEMATICS & PHYSICS STUDENTS)						
Paper No.	**Generic Elective II**						
Category	**Generic Elective**	**Year**	I	**Credits**	3	**Course Code**	
		Semester	II				
Instructional hours per week	**Lecture**	**Tutorial**	**Lab Practice**			**Total**	
	4	-	-			4	

Prerequisites	Chemistry for physical sciences -I
Objectives of the course	This course aims at providing knowledge on the • Co-ordination Chemistry and Water Technology • Carbohydrates and Amino acids • basics and applications of electrochemistry • basics and applications of kinetics and catalysis • Various photochemical phenomenon
Course Outline	**UNIT I** **Co-ordination Chemistry and Water Technology** Co-ordination Chemistry: Definition of terms-IUPAC Nomenclature - Werner'stheory - EAN rule - Pauling's theory – Postulates - Applications to $[Ni(CO)4]$, $[Ni(CN)4]^{2-}$,$[Co(CN)6]^{3-}$ Chelation - Biological role of Haemoglobin and Chlorophyll (elementary idea) – Applications in qualitative and quantitative analysis. Water Technology: Hardness of water, determination of hardness of water using EDTA method, zeolite method-Purification techniques- BOD, COD.
	Unit II **Carbohydrates and Amino acids** Carbohydrates: Classification, preparation and properties of glucose, fructose and sucrose. Discussion of open chain ring structures of glucose and fructose. Glucose –fructose interconversion. Properties of starch and cellulose. Amino acids: Classification - preparation and properties of alanine, preparation of dipeptides using Bergmann method. RNA and DNA (elementary idea only).

	UNIT III **Electrochemistry** Galvanic cells - Standard hydrogen electrode - calomel electrode - standard electrode potentials -electrochemical series. Strong and weak electrolytes - ionic product of water -pH, pKa, pKb. Conductometric titrations - pH determination by colorimetric method – buffer solutions and its biological applications - electroplating - Nickel and chrome plating – Types of cells -fuel cells-corrosion and its prevention.

	UNIT IV **Kinetics and Catalysis** Order and molecularity. Integrated rate expression for I and II (2A □ Products) order reactions. Pseudo first order reaction, methods of determining order of a reaction – Half-life period – Catalysis - homogeneous and heterogeneous, catalyst used in Contact and Haber's processes. Concept of energy of activation and Arrhenius equation.
	UNIT V Photochemistry Grothus-Draper's law and Stark-Einstein's law of photochemical equivalence, Quantum yield - Hydrogen-chloride reaction. Phosphorescence, fluorescence, chemiluminescence and photosensitization and photosynthesis (definition with examples).
Extended Professional Component (is a part of internal component only, Not to be included in the external examination question paper)	Questions related to the above topics, from various competitive examinations UPSC/ JAM /TNPSC others to be solved (To be discussed during the Tutorial hours)
Skills acquired from this course	Knowledge, Problem solving, Analytical ability, Professional Competency, Professional Communication and Transferable skills.

Recommended Text	1. V.Veeraiyan, Textbook of Ancillary Chemistry; High mount publishing house, Chennai, first edition,2009. 2. S.Vaithyanathan, Text book of Ancillary Chemistry; Priya Publications, Karur,2006. 3. Arun Bahl, B.S.Bahl, Advanced Organic Chemistry; S.Chand and Company, New Delhi, twenty third edition, 2012. 4. P.L.Soni, H.M.Chawla, Text Book of Organic Chemistry; Sultan Chand & sons, New Delhi, twenty ninth edition, 2007.
Reference Books	1. P.L.Soni, Mohan Katyal, Text book of Inorganic chemistry; Sultan Chand and Company, New Delhi, twentieth edition, 2007. 2. R.Puri, L.R.Sharma, M.S.Pathania, Text book Physical Chemistry; Vishal Publishing Co., New Delhi, forty seventh edition, 2018.
	3. B.K,Sharma, Industrial Chemistry; GOEL publishing house, Meerut, sixteenth edition, 2014.
Website and e-learning source	

Course Learning Outcomes (for Mapping with POs and PSOs)
On completion of the course the students should be able to

CO 1: write the IUPAC name for complex, different theories to explain the bonding in coordination compounds and water technology

CO 2: explain the preparation and property of carbohydrate, amino acids and nucleic acids.

CO 3: apply/demonstrate the electrochemistry principles in corrosion, electroplating and fuel cells.

CO 4: identify the reaction rate, order for chemical reaction and explain the purpose of a catalyst.

CO 5: outline the various type of photochemical process.

CO /PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weightage	15	15	15	15	15
Weighted percentage of Course Contribution to PSOs	3.0	3.0	3.0	3.0	3.0

Level of Correlation between PSO's and CO's

CO /PO	PO1	PO2	PO3	PO4	PO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weightage	15	15	15	15	15
Weighted percentage of Course Contribution to POs	3.0	3.0	3.0	3.0	3.0

Level of Correlation between PO's and CO's

CHEMISTRYFORPHYSICALSCIENCESII
(FORMATHEMATICS&PHYSICSSTUDENTS)

Time: 3 Hours Max. Marks: 75

SECTION – A (10 X 2 = 20)

Answer ALL the questions.

1. Give EANrule.
2. What is BOD?
3. What are Carbohydrates? Give an example.
4. Write the preparation of alanine.
5. What are buffer solutions?
6. What is pH?
7. Define Half-lifeperiod.
8. Define Catalysis.
9. State Grothus-Draper'slaw
10. How will you calculate Quantumyield?

SECTION – B (5 X 5 = 25)

Answer ALL the questions.

11. (a) Explain the determinationofhardnessofwaterusingEDTAmethod

Or

(b) Write the BiologicalroleofHaemoglobin.

12. (a) Discuss aboutopenchainringstructureofglucose.

Or

(b) Write the differences between RNA andDNA.

13. (a) Explain the determination of pH by colorimetric method

Or

(b) Elaborate about Nickelandchromeplating.

14. (a) Derive rate expression for first order kinetics.

Or

(b) Explain the conceptofenergyofactivation.

15. (a) Write the differences between Phosphorescence andfluorescence.

Or

(b) How will you calculate quantum yield for Hydrogen-Chlorinereaction.

SECTION **– B (3 X 10 = 30)**

Answer any THREE of the following questions.

16. Write Postulates of Pauling'stheory and apply it for$[Ni(CN)4]^{2-}$
17. Write the preparation of dipeptides using Bergmann method.
18. Write notes on Conductometrictitrations.
19. Give any two methodsofdeterminingorderofareaction.
20. Explain about photosensitizationandphotosynthesis.

<table>
<tr><td>Title of the Course</td><td colspan="7">CHEMISTRY PRACTICAL FOR PHYSICAL AND BIOLOGICAL SCIENCES
(For Mathematics and Physics – I year/II semester; For Botany and Zoology II year/IV semester)</td></tr>
<tr><td>Paper No.</td><td colspan="7">Generic Elective VI</td></tr>
<tr><td>Category</td><td>Generic Elective</td><td>Year
Semester</td><td>I/ II
II/IV</td><td>Credits</td><td>1</td><td>Course Code</td><td></td></tr>
<tr><td>Instructional hours per week</td><td>Lecture</td><td>Tutorial</td><td colspan="3">Lab Practice</td><td>Total</td></tr>
<tr><td></td><td>-</td><td>-</td><td colspan="3">2</td><td>2</td></tr>
<tr><td>Prerequisites</td><td colspan="7"></td></tr>
<tr><td>Objectives of the course</td><td colspan="7">This course aims to provide knowledge on
• identification of organic functional groups
• different types of organic compounds with respect to their properties.
• determination of elements in organic compounds..</td></tr>
<tr><td></td><td colspan="7">SYSTEMATIC ANALYSIS OF ORGANIC COMPOUNDS
The analysis must be carried out as follows:</td></tr>
<tr><td></td><td colspan="7">(a) Functional group tests [phenol, acids (mono & di) aromatic primary amine, amides (mono & di), aldehyde and glucose].
(b) Detection of elements (N, S, Halogens).
(c) To distinguish between aliphatic and aromatic compounds.
(d) To distinguish – Saturated and unsaturated compounds.</td></tr>
<tr><td>Reference Books</td><td colspan="7">V.Venkateswaran, R.Veerasamy, A.R.Kulandaivelu, Basic Principles ofPractical Chemistry; Sultan Chand & sons, Second edition, 1997.</td></tr>
<tr><td colspan="8">Course Learning Outcomes (for Mapping with POs and PSOs)
On completion of the course the students should be able to
CO 1: gain an understanding of the use of standard flask and volumetric pipettes, burette.
CO 2: design, carry out, record and interpret the results of volumetric titration.
CO 3: apply their skill in the analysis of water/hardness.
CO4: analyze the chemical constituents in allied chemical products</td></tr>
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CO /PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
Weightage	12	12	12	12	12
Weighted percentage of Course Contribution to PSOs	3.0	3.0	3.0	3.0	3.0

Level of Correlation between PSO's and CO's

CO /PO	PO1	PO2	PO3	PO4	PO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
Weightage	12	12	12	12	12
Weighted percentage of Course Contribution to POs	3.0	3.0	3.0	3.0	3.0

Level of Correlation between PO's and CO's

SCHEME OF VALUATION

CHEMISTRY PRACTICAL FOR PHYSICAL AND

BIOLOGICAL SCIENCES

(For Mathematics and Physics – I year/II semester; For Botany and Zoology II year/IV semester)

Internal assessment: 25 Marks

External assessment: 75 marks

Total: 100 marks

Max. Marks: 75

Record: 15 Marks

Organic Analysis: 60 Marks

Organic Analysis: 60 Marks

Preliminary Test: 8 Marks

Aliphatic or Aromatic:7 Marks

Saturated or unsaturated:7 Marks

Tests for elements: 9 Marks

Confirmation Tests: 12 Marks

Functional groups: 10 Marks

Derivative/Coloured reaction: 7 Marks.